

NON-PUBLIC?: N
ACCESSION #: 8906050205
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Catawba Nuclear Station, Unit 2 PAGE: 1 OF 06

DOCKET NUMBER: 05000414

TITLE: Manual Reactor Trip Due To Main Feedwater Pump Low Pressure Steam
Supply Being Isolated For Unknown Reasons
EVENT DATE: 06/03/88 LER #: 88-021-01 REPORT DATE: 05/24/89

OPERATING MODE: 1 POWER LEVEL: 038

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
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COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE TO NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On June 3, 1988, at approximately 2240 hours, a manual Reactor trip was initiated due to an imminent low low Steam Generator (S/G) level. The Unit was in the process of decreasing power to 7% for inspection and repair of packing and seat leaks on various valves. At the preceding shift turnover, oncoming Operations personnel were informed that the Auxiliary Steam Header was aligned to supply Main Feedwater Pump (CFPT) 2A which would allow the packing and steam leak tagout to be placed. As the Nuclear Equipment Operator (NEO) closed the high pressure steam supply to CFPT 2A and 2B per the tagout, the Nuclear Control Operator (NCO) noticed decreasing Main Feedwater/Main Steam (CF/SM) differential pressure. A Nuclear Operator Technician was dispatched and the CFPT steam supply valve was reopened. The CF/SM differential pressure returned to normal. The NCOs were manually controlling the CF Control valves to restore S/G levels. During this period, the S/G B CF Control valve was overthrottled, causing the level to decrease rapidly. To prevent a challenge of the Reactor Protection System, a manual

Reactor trip was initiated. The Unit was operating at 38% power at the time of the trip.

This incident is attributed to the Unit 2 Auxiliary Steam Header Supply Isolation Valve being closed for a undetermined reason. This steam supply was thought to be open, based on information received at shift turnover. This incident has been reviewed by appropriate personnel. Operations has determined that Auxiliary Steam supplied by cross connection is incapable of adequately supplying the opposite Unit CFPTs. Therefore, this transient may have occurred with or without the unauthorized operation of 2AS59.

END OF ABSTRACT

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BACKGROUND

The Auxiliary Steam (AS) EIIS:SA! System provides a normal and auxiliary source of steam to various plant equipment. The AS System consists of steam headers which are equipped with control valves to deliver steam at the proper operating pressure of the applicable equipment.

The Turbine Building AS header receives steam supply from the Main Steam System EIIS:SB! and/or the Auxiliary Electric Boilers (AEB) EIIS:BLR! to supply the Main Feedwater Pump Turbines (CFPT) EIIS:P!, and also other equipment. AS is normally used as backup and a startup source of steam for the CFPTs, with Main Steam and crossover steam as the primary sources. If 1AS33 EIIS:ISV!, Unit 1 AS Header Supply, and 1AS59 EIIS:ISV!, Unit 2 AS Header Supply are both open, then the Auxiliary Steam Systems for both Units are cross-connected.

1AS59 is a 12 inch hand wheel gate valve that is located 23 feet above the Unit 2, 568 elevation Turbine Building floor near the Service Building wall. This valve has no remote indication and is chainwheel operated. The normal differential pressure across this valve is 150 psig if the ARBs are not in operation.

DESCRIPTION OF EVENT

It is estimated that 2 weeks prior to May 31, 1988, 1AS59, Unit 2 Auxiliary Steam Header Isolation Valve, had been opened to cross-connect the AS header to both Units. On May 31, 1988, during the day shift, Chemistry had requested that Operations close 1AS59 due to water chemistry problems. The valve was apparently closed on the night shift of May 31 or day shift June 1. Subsequently, the valve was apparently opened. The valves position had been and was being documented on the Operations Shift Turnover Sheets.

On June 3, at shift turnover A Nuclear Control Specialist (NCS) was informed that the AS Header was not aligned to both units. At approximately 1000 hours, the NCS was in the process of starting Auxiliary Boiler (AEB) B per procedure. He found 1AS59 was in the open position by observing the valve stem position and manipulating the chainwheel operator. The valve had apparently been reopened between June 1 and June 3, but not properly documented. The NCS also found 1AS33 open, which means the AS Header was cross tied to both Units. The NCS consulted with the Unit Supervisor on other possible alignments that would not connect the AS Header to both Units. At 1230 hours, the NCS again verified 1AS59 to be open. This was done while he verified that 1CB2 EIIS:ISV!, Unit 2 Upper Surge Tank Supply to Boilers A & B, was open as required to support AEB startup. Both valves are located in close proximity in the Unit 2 Turbine Building on 568 elevation.

At 1900 hours, on June 3, the Operations night shift was informed during turnover that 1AS59 was open. Unit power was being decreased so that repairs on the steam leaks on several valves associated with Main Feedwater Pump Turbine (CFPT) 2A, could be made. At approximately 2200 hours, Unit power was at approximately 38%. Operations was preparing to tagout equipment associated with the various valve stem leak repairs. A NEO notified the NCO prior to starting the tagout.

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At approximately 2235 hours, the NEO closed valve 2SP34 EIIS:ISV!, Main Steam to CFPT 2A and 2B per the tagout. The NCO noticed that the Main Feedwater Main Steam (CF/SM) differential pressure was decreasing and the CFPT speed was also decreasing. NCO took manual control of CFPT 2B in an attempt to restore S/G Narrow Range (NR) levels. Control Room personnel attempted to contact the NEO but were unsuccessful due to the high noise levels in the Turbine Building.

A Nuclear Operator Technician was dispatched to reopen 2SP34. The NEO reopened 2SP34 and the CF/SM differential pressure returned to normal. S/G levels had decreased to approximately 40% NR due to the decrease in CFPT speed.

S/G NR levels began to rapidly increase due to increasing CFPT 2B speed and CF Control Valves being fully open. In an attempt to restore and stabilize the S/G NR levels, CFPT 2B was returned to automatic mode and the CF Control Valve controls were placed into manual mode.

The NCOs were successful in controlling the S/Gs A, C and D, but CF flow to S/G B was overthrottled, thus under feeding S/G B for approximately one minute. It was later discovered that Valve Demand position indication did

not match actual valve position, but this did not affect the NCOs actions. S/G A, C and D levels peaked at approximately 65%, but S/G B dropped towards the low low level Reactor trip setpoint.

At 2240:00:391 hours, a manual Reactor trip was initiated due to the impending low low level in S/G B. The Main Turbine tripped on Reactor trip at 2240:00:477 hours. S/G B Low Low Level Reactor Trip signal occurred at 2240:00:689 hours. The Motor Driven Auxiliary Feedwater (CA) pumps started and the S/G Blowdown valves closed, as expected. Feedwater Isolation actuated due to Reactor trip coincident with low Tavg. At 2240:13:747 hours, S/G A Low Low Level alarm occurred. The Turbine Driven Auxiliary Feedwater Pump started due to 2 out of 4 S/Gs reaching low low level.

At 2240:07 hours, the first bank of the Condenser Dump valves opened. The Condenser Dump valves had reclosed automatically by 2242:39 hours. The CAPT was secured at 2242:35 hours.

The S/G Blowdown valves were reopened and the Feedwater Isolation was reset by the NCOs at approximately 2323 hours. Motor Driven CA Pumps 2A and 2B were secured at approximately 2346 hours. The Unit returned to Mode 1, Power Operation, on June 4, 1988 at approximately 1540 hours.

CONCLUSION

The activity which closed 1AS59, Unit 2 Auxiliary Steam Header Isolation Valve, could not be determined. The valve had been verified twice to be open on the previous shift. The oncoming shift was instructed during turnover that the valve was open. No activities could be identified which would have manipulated the valve.

On June 5, Unit power was increasing. At 1100 hours, the Nuclear Control Specialist reported to the Shift Supervisor that 1AS59 was closed again. The

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Shift Supervisor suspected that a potential intentional act had taken place. He notified station management as required by the Station Directives. The valve was reopened and placed under surveillance for several hours. As a result of the June 5 incident, a General Office Security Specialist was requested to perform an independent assessment of the problems. Additional interviews were performed without success.

Inspection of the chainwheel operators for 1AS59 and 1CB2, Unit 2 Upper Surge Tank Supply to Boilers A & B indicated that the label for 1CB2 was missing and the label for 1AS59 was painted over but legible. The labels on the actual valves were in place and legible. However, these valves are located about 20

feet above the Turbine Building floor.

1AS59 was cycled several times during the week of May 29, 1988. OP/1/B/6250/07A, Unit 1 Auxiliary Steam System Alignment, indicates that 1AS59 is normally closed. The valve is not listed in the procedure as being open in any section or enclosure. OP/2/B/6250/07A, Unit 2 Auxiliary Steam System Alignment, Enclosure 4.3, Switching Service Building Auxiliary Steam to 'Unit 2, opens 1AS59. During this incident, Auxiliary Steam was aligned to both Units and no procedure fully applied. Had a procedure been available to direct this alignment, stronger administrative controls may have prevented 1AS59 from being misaligned. The valve status of 1AS59 had been identified during the week in several Operations Shift Turnover Sheets. The valve status was not identified in the Open Items Book or on a Tagout Removal and Restoration Record sheet (R&R). These methods are used to identify out of normal alignment.

1AS59 was radiographed on June 24 to examine the possibility of the valve's stem and internals not operating properly. The valve was found to be operating properly.

Main Feedwater to S/G B CF Valve Position Demand indication was found to be indicating approximately 10% high on June 7. All S/G Demand indications were checked and Demand indications for SIGs A and D were also found to be high. Standing Work Requests will be developed to verify Valve Demand indication for the CF Main Control valves. Also, calibration procedures are being developed to verify Demand indication at more points than previously done. Both of these actions are identified in LER 414/88-20.

Operations has attempted to verify the capability of the cross-connected Auxiliary Steam System to adequately supply opposite Unit loads. This was done with Unit 1 operating at 85% power. It was concluded that it was not possible for any Unit 1 AS alignment to adequately supply steam for both Unit 2 CFPTs. Therefore, this transient may have occurred with or without the unauthorized operation of 2AS59.

There have been no previous Reactor trips due to piping system misalignments for which the cause has not been determined.

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CORRECTIVE ACTION

SUBSEQUENT

(1) An extensive investigation was performed by Operations and General Office personnel to determine why 1AS59 was closed.

- (2) The incident was reviewed at the Shift Supervisors meeting, with emphasis on the use of the R&R.
- (3) The valve labels on the chainwheel operators for 1AS59 and 1CB2 were replaced.
- (4) 1AS59 was radiographed and found to be operating properly.
- (5) Subsequent to this incident, 1AS59 being OPEN was documented on an R&R.
- (6) Operations verified that AS cross-connection is incapable of adequately supplying opposite unit CFPTs.

SAFETY ANALYSIS

The Reactor was manually tripped to prevent a challenge of the Reactor Protection System and an automatic trip on S/G low low level. CF Isolation was automatically initiated upon Reactor trip with low Tavg (564 deg. F). Both Motor Driven CA pumps autostarted upon S/G B low low level, and a Turbine Driven CA Pump Autostart signal occurred approximately 12 seconds later upon low low level in 2 out of 4 S/Gs. The redundant steam supply valves for the Turbine Driven CA Pump, SA2 and SA5, opened within 12 seconds of the SSPS autostart signal. The Reactor trip breakers opened within 54 milliseconds of the manual Reactor trip and all control rods fell to the bottom of the core, reducing power to decay heat level.

Reactor Coolant System temperature temporarily decreased approximately 4 deg. F posttrip, and stabilized at 550 deg. F within 30 minutes posttrip, 7 deg. F from the no-load target of 557 deg. F. Pressurizer pressure decreased to a minimum of 2163 psig posttrip, and stabilized at 2230 psig within 30 minutes posttrip, 5 psig from the no-load target of 2235 psig. Pressurizer level temporarily decreased 4% prior to the trip due to the feedwater transient. Pressurizer level decreased to a minimum value of 22% posttrip, and stabilized at 30% by 30 minutes posttrip, 5% from the no-load target of 25%. Steam pressure increased to a maximum of 1080 psig immediately posttrip, decreased to a minimum value of 997 psig, and then stabilized at 1025 psig 30 minutes posttrip, 65 psig from the no-load target of 1090 psig. S/G C and D levels stayed on narrow range scale posttrip and decreased to a minimum value of 12% and 4%, respectively. S/G A and B levels reached a mini-i- wide range indicated value of 54% and 50%, respectively. Steam pressure correction of these values yields actual levels of 71% and 65% for S/Gs A and B, respectively.

Bank 1 of the steam dump to condenser valves cycled to dump steam following the Reactor trip. The Operator isolated and throttled various steam valves to limit the posttrip cooldown. Due to the pretrip transient caused by a reduction in CF pump speed and flow, pressurizer pressure temporarily decreased to 20 psig below the lower Tech Spec limit of 2222 psig. Pressure was recovered to above the lower Tech Spec limit in approximately 1.5 minutes, well within the action statement time limit of 2 hours. At the time that CA flow to the S/Gs was throttled to less than 450 gpm (as determined by a computer point alarm and transient monitor plots), S/G levels were increasing and above 47% wide range as required by the Reactor trip emergency procedure. Minimum Reactor Coolant System subcooling was 74 Deg. F. Adequate heat sink was available and maintained at all times for core decay heat removal.

This event is bounded by the "Loss of Normal Feedwater Flow" transient as discussed in Section 15.2.7 of the Catawba FSAR. All safety system equipment was available throughout this event. The cooldown limits of 100 deg. F per hour for the Reactor Coolant System and 200 deg. F per hour for the Pressurizer, were not exceeded. Integrity of the fuel cladding, Reactor Coolant System, and Containment structure was maintained at all times.

This event is reportable pursuant to 10 CFR 50.73, Section (a)(2)(iv).

The health and safety of the public were not affected by this incident.

ATTACHMENT 1 TO 8906050205 PAGE 1 OF 1

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HAL B. TUCKER TELEPHONE
VICE PRESIDENT (704) 373-4531
NUCLEAR PRODUCTION

May 24, 1989

U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Document Control Desk

Subject: Catawba Nuclear Station, Unit 2
Docket No. 50-414
LER 414/88-21, Revision 1

Gentlemen:

Pursuant to 10 CFR 50.73 Section (a) (1) and (d), attached is Revision I to Licensee Event Report 414/88-21 concerning a manual reactor trip due to main feedwater pump low pressure steam supply being isolated for unknown reasons. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Hal B. Tucker

PGL/31/lcs

Attachment

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